DOCUMENT RESUME

ED 303 528 UD 026 459

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TITLE Delivering Academic Excellence to Culturally Diverse Populations (Language Development through Math/Science Activities). Conference Proceedings (Saddle Brook, New Jersey, December 7-8, 1984).
INSTITUTION Fairleigh Dickinson Univ., Teaneck, NY. Peter Sammartino Coll. of Education.
PUB DATE Dec 84
NOTE 60p.; The conference was sponsored by the Bilingual Education Skills and Training Center of the Peter Sammartino College of Education at Fairleigh Dickinson University.
PUB TYPE Collected Works - Conference Proceedings (021)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Bilingual Education; *Curriculum Development; Educational Change; Elementary School Students; Elementary Secondary Education; *English (Second Language); English for Science and Technology; English Instruction; *Integrated Curriculum; Limited English Speaking; *Mathematics Curriculum; *Minority Groups; Outcomes of Education; Relevance (Education); *Science Curriculum; Secondary School Students; Urban Education

ABSTRACT

This document includes the proceedings of a conference that made the following points about American society now and in the future: (1) racial changes in demographics require preparing urban minority students for entrance into scientific and technological fields; (2) the science/mathematics education movement of the late 1950s into the 1970s has failed to prepare a scientifically literate labor pool; and (3) the efficiency of language instruction across all segments of society must be improved, but especially for students with limited English proficiency. The major conclusion of the conference is that science and mathematics instruction must be combined with English as a Second Language (ESL) instruction. Major presentations are the following: (1) "A Report That Changed History" (Milton S. Goldberg); (2) "Teacher Education and Language Development through Math and Science: New Jersey's Response" (Martin S. Friedman); and (3) "Science and Math: A Natural Context for Language Development" (Edward A. De Avila). Panel discussions were "Learning for the 21st Century" (Stanley Kluj), and "The Role of ESL Teacher in Reinforcing Language Development for Student Progress in Math or Science Classes" (Joyce Penfield). Concurrent sessions include the following plenary sessions: (1) "Using Learning Strategies to Understand Secondary Science Presentations" (Anna Uhl Chamot and J. Michael O'Malley); and (2) "Language Development in a Piagetian Beginning Arithmetic Program" (Constance Kamii); and the following concurrent sessions: (1) "A Review of Research on Learning Styles: Implications for the Development and Implementation of CAI for Bilingual Teacher Training" (Mary Farrell); (2) "Cooperative Learning: Grouping with a Twist" (Patricia Klagholz); (3) "Articulating Math, Science and Bilingual Teacher Training" (Annette Lopez and Mark O'Shea); (4) "Computer-Assisted Bilingual Math Instruction for Elementary Students" (Patricia Mullinex); and (5) "Booting Up: Broadening Computer Access to Hispanic High School Students" (Marietta Saravia-Shore). Two brief lists of related publications, and a list of presenters are included. (FMW)

11-1-88

ED303528

CONFERENCE PROCEEDINGS

Delivering Academic Excellence To Culturally Diverse Populations

(Language Development Through Math/Science Activities)

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Printed in the United States of America

CONFERENCE PROCEEDINGS

Delivering Academic Excellence To Culturally Diverse Populations

(Language Development Through Math/Science Activities)

December 7-8, 1984
Treadway Inn
Saddle Brook, New Jersey

Sponsored by:
Bilingual Education Skills and Training Center
of the
Peter Sammartino College of Education
at
Fairleigh Dickinson University

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Acknowledgements

Heartfelt thanks are extended to the following institutions, agencies, and individuals for their unqualified support of this College of Education activity:

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Office of Equal Educational Opportunity
Department of Education
Trenton, New Jersey 08625

Office of Bilingual & International Education
Department of Higher Education
Trenton, New Jersey 08625

Evaluation, Dissemination & Assessment Center
49 Washington Avenue
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Dedication

This monograph is dedicated to the many education professionals who daily strive to deliver academic excellence to the diverse cultural populations in the United States of America and throughout other parts of the world.

We have recognized the role that mathematics and the sciences play in advancing our society and in protecting ourselves from a host of internal and external destructive forces. While, in the past, intuition has indicated a different and positive role for mathematics and science in the school curriculum related to language, it only is in recent years that research and practice have clearly indicated this role in improving language instruction for all cultures; especially related to English language and English as a second language instruction. Now it *is* clear that delivering and obtaining excellence in most academic areas is not possible without cognitive-academic proficiency in English language.

The Conference, organized by our College of Education and its BEST Center, reported upon herein, was dedicated to bringing to the fore the research and practices related to the "science-math-language approach" which will contribute to the delivery of academic excellence in teacher education and school programs. For immediate actions of these components of the education establishment in utilizing science and mathematics content and activities in the teaching of English language will determine the size, the nature, and the quality of the pool of educated citizenry available for technical and professional careers in future years.

I wish to thank those who participated in this Conference on Delivering Excellence for their scholarly and knowledgeable input; and in addition recognize the dedication of Drs. Bilotta, Farrell, López and O'Shea and other faculty in making the Conference an integral part of educational advancement during the 1980's and beyond.

Francis X. Sutman, Dean
Peter Sammartino College of Education

TABLE OF CONTENTS

I.	ACKNOWLEDGEMENTS		i
II.	DEDICATION		ii
III.	PROLOGUE		v
IV.	MAJOR PRESENTATIONS		ix
	Milton S. Goldberg	A Report That Changed History	1
	Martin S. Friedman	Teacher Education and Language Development Through Math and Science: New Jersey's Response	11
	Edward A. De Avila	Science and Math: A Natural Context for Language Development	19
V.	PANEL DISCUSSION		25
	Stanley Kluj	Learning for the 21st Century	27
	Joyce Penfield	The Role of ESL Teacher in Reinforcing Language Development for Student Progress in Math or Science Classes	29
VI.	CONCURRENT SESSIONS		31
	PLENARY SESSIONS		
	Anna Uhl Chamot and J. Michael O'Malley	Using Learning Strategies to Understand Secondary Science Presentations	33

Constance Kamii	Language Development in a Piagetian Beginning Arithmetic Program	35

CONCURRENT SESSIONS

Mary Farrell	A Review of Research on Learning Styles: Implications for the Development and Implementation of CAI for Bilingual Students	37
Patricia Klagholz	Cooperative Learning: Grouping with a Twist	45
Annette Lòpez and Mark O'Shea	Articulating Math, Science and Bilingual Teacher Training	47
Patricia Mullinex	Computer-Assisted Bilingual Math Instruction for Elementary Students	49
Marietta Saravia-Shore	Booting Up: Broadening Computer Access to Hispanic High School Students	51

VII. SUMMARY and RECOMMENDATIONS 53

VIII. RELATED PUBLICATIONS 55

IX. LIST of PRESENTERS 57

CONTRIBUTORS

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Prologue

Changing demographics demand that greater attention be paid to the educational needs of minority young people. Recent statistics illustrate that by 1990 minorities will constitute the majority in twenty-three of twenty-five of the nation's largest cities. These same statistics suggest that the new "urban majority" is grossly underserved by the public school system.

With the recent emphasis on high technology, and projections of a high-tech future (requiring higher order skills), the need for a challenging yet socially responsive curriculum for all students is an educational imperative.

The data continues to reflect the lack of success of Hispanic minorities in the educational system. Typically, Hispanic children are two to three levels behind other students (Pifer, 1978), and Hispanic youth continue to drop out of school in record numbers; in urban ghetto areas, the school drop-out rate is as high as 85%, and nationally only about 30% manage to complete a high school education. Of those who graduate, less than 7% seek a college education. Those who do attend college usually opt to major in the social sciences; as a result these minorities continue to be sparsely represented in the high-tech fields that are so crucial to our nation's survival.

These alarming statistics are of great consequence. They dramatically illustrate the failure of the educational system to properly educate the children of poverty, the majority of whom are minorities, to compete successfully for employment in the highly competitive private sector.

National educational policy is in the process of being re-examined, and reconceptualized to make it more responsive to the culturally and economically diverse groups it purports to service. We are a part of that process. Nowhere is that need more critical than in the areas of mathematics and science; particularly since a disproportionately large number of minorities are not participating in mathematics or science-related careers. This is not because minorities are not capable of comprehending abstract concepts nor is it because minorities' occupational aspirations are not as high—the research shows that their aspirations are as high or higher than those of their peers. Instead, their lack of success in these areas is related to a number of factors. For example, Valverde (1984) suggests that the teaching of mathematics to language minorities is too field independent. Yet, some minority groups, e.g., Hispanics, tend to be more field sensitive, and favor cooperative learning, over open-ended, highly individualized instruction. Ortiz-Franco (1981) believe that part of the problem is due to the lack of intervention programs for pre-college minority students who are interested in pursuing careers in mathematics and science. Cummins (1980) posits the theory that cognitive academic language proficiency (CALPS) is needed in order to have a chance to master the language of textbooks and the abstractness of new concepts. Basic interpersonal communica-

tion skills (BICS) are insufficient in order to understand and assimilate linguistically complex problems in content area subjects such as mathematics and science. Yet, it is not uncommon for the English as a second language curriculum only to concentrate on developing BICS (basic interpersonal communicative skills) instead of CALPS (cognitive academic language proficiency skills). His theory is corroborated by Cuevas (1984) who believes that a mathematics curriculum is needed that would develop second-language skills, and more research is needed into the relation between second-language learning and mathematics (and science) learning. Penfield and Orstan-Galicia (1981) and Kessler and Quinn (1980) have corroborated other investigations in the area of science which show a positive correlation between cognitive and language development.

The December 7-8 Conference: "Delivering Academic Excellence to Culturally Diverse Populations: Language Development through Mathematics and Science Activities" was organized to serve as a forum for the discussion of these and other issues related to the mathematics and science education of language minorities in particular. The conference brought together outstanding educators and researchers in pursuit of information which would assist them in providing their students with a sensitive, sensible and challenging curriculum in these areas. Cognitive theorists, curriculum specialists, administrators and teachers interacted for two days; and their presentations, serious discussions and brainstorming led to some recommendations for more effective ways of teaching language minorities in the areas of concern. The abstracts of these presentations, and the subsequent recommendations are published in this document. We know that you will find them both professionally realistic and useful.

Editor

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Major Presentations

Milton S. Goldberg, U.S. Department of Education and Executive Director, National Commission on Excellence in Education.

Title of Presentation:

"A REPORT THAT CHANGED HISTORY"

Martin S. Friedman, Director of Teacher Education, New Jersey Department of Higher Education

Title of Presentation:

"TEACHER EDUCATION AND LANGUAGE DEVELOPMENT THROUGH MATH AND SCIENCE: NEW JERSEY'S RESPONSE"

Edward De Avila, Senior Research Associate, Stanford University

Title of Presentation:

"SCIENCE AND MATH: A NATURAL CONTEXT FOR LANGUAGE DEVELOPMENT"

A Report That Changed History

Milton S. Goldberg

(Abstract)

This address indicates in broad terms the nature of the educational reform movement in the United States, indicating how the National Commission's activities and report represent this movement. The intent of the Commission will be clearly delineated spelling out the messages that their report intended to be conveyed to the professional community and to the public.

The sense of the Commission's recommendations for educational reform is considered, leading to implications for both excellence and equity in educational practice across the diverse populations of the United States. These two objectives are viewed as inseparable and essential components of the "American dream." The historical background leading to the inseparability of excellence and equity lead to confidence that both objectives are attainable.

The role that teacher education can and must play in reestablishing excellence in education while continuing to improve on equity is considered. For it is very clear that effective teacher education and training at both the preservice and inservice levels are at the heart of the reform movement.

A REPORT THAT CHANGED HISTORY

On May 11, 1984, President Reagan told former members of the National Commission on Excellence in Education assembled on the South Lawn of the White House, that "it's not overstating things at all to say that your report changed our history by changing the way we look at education and putting it back on the American agenda."

He may not have been overstating the case. The report to which he referred, *A Nation at Risk: The Imperative for Educational Reform*, helped create a huge and growing public mandate for change. It may yet prove to be the case that *A Nation at Risk* will serve not simply as a centerpiece for excellence in education but also as the foundation for excellence in American life.

At the May 11 ceremony held to acknowledge educational change in the twelve months since the Commission issued its report we released another report from the Department of Education, *The Nation Responds*, documenting a "tidal wave of reform" in the schools.

Among the elements of this reform movement are:

- raising of high school graduation requirements;
- studies of how to make textbooks more challenging;
- consideration of longer school days and a longer school year; and work to make better use of time in school;
- projects and studies to improve teacher certification procedures, performance incentives, and teacher status; and
- increased public interest in quality education, as represented by PTA membership and corporate involvement with schools.

THE IMPERATIVE FOR EDUCATIONAL REFORM

What generated all this fuss?

A deceptively thin little "Open Letter to the American People," in which a panel of distinguished Americans, most of them professional educators, warned in April 1983 that the "educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people." The bipartisan Commission referred to public and private schools, and included under the term "educational foundations of our society" the schools, other institutions which support learning including the family, and the larger social values of respect and reverence for learning and accomplishment.

The report sparked a national debate on education — and on what we need to do about it — that could prove seminal in the development of an ethic of excellence in education and in American life. The debate was further enhanced by the issuance of works by Ernest Boyer, John Goodlad, and Theodore Sizer as well as a number of prestigious Commissions and special bodies. Even now, a National Commission is deliberating on how to improve teacher education.

This debate was quite consciously sought by members of the Commission under the leadership of David Pierpont Gardner, then President of the University of Utah, and now President of the University of California. The clarion call sought by the Commission was meant to remind the Nation of the importance of education as the foundation of our leadership in change, technical invention, and personal fulfillment. The Commission felt strongly that the well-being of our schools is essential to the well-being of our people.

ESSENTIAL MESSAGES

The Commission intended that three essential messages be heard by the American people.

The very first is found in the title of the Commission's report: the Nation is at risk. It is at risk because our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world. Further, we appear to have forgotten that it is intellectual, moral, and spiritual strength which knits together the fabric of our society. The Commission did not believe that education alone was at fault. They observed that there are many causes and dimensions of the problem, and education is only one. It is nevertheless the one that undergirds our "prosperity, security, and civility."

This is surely not the first national body to draw attention to the central importance of education to our national well-being. Indeed, in 1980, the President's Commission for a National Agenda for the Eighties, reported that the "continued failure of the schools to perform their traditional role adequately... may have disastrous consequences for this Nation."

And just as assuredly, it is not the last. One week after the National Commission on Excellence issued its report, an educational task force of the Twentieth

Century Fund, called our schools "the Nation's most important institution for the shaping of future citizens," and warned that "threatened disaster can be averted only if there is a national commitment to excellence in our public schools." But it may be the first to insist — as the essential first premise — that inattention to the schools puts the very well-being of the Nation at risk.

The second essential message is that mediocrity, not excellence, is the norm in American education. The Commission was delighted to come across extraordinary examples of dedicated men, women, and students excelling throughout American education, from kindergarten through postgraduate work. In its report it paid tribute to the "heroic" examples of excellence it came across as individuals struggled, sometimes against all odds, to bring out the best in themselves and in others. But, on balance, mediocrity prevails and what the Commission called "a rising tide of mediocrity" threatens to overwhelm the educational foundations of American society. And the evidence of that tide can be found in American homes, where apathetic children adopt the attitude of "let it slide" in the face of parental indifference; it can be found in American schools, when frustrated teachers say "that's good enough" when faced with student apathy and societal indifference; and it can be found in public misunderstanding of the day-to-day problems faced by those who work in school.

But we live daily in the flotsam cast up by the tide:

- millions of American adults are functionally illiterate;
- about 13 percent of our teenagers are also functionally illiterate, with perhaps 40 percent of minority youth in this category;
- a dramatic decline in the number of students demonstrating superior achievement on the SAT;
- increases of 72 percent in remedial mathematics courses in public 4-year colleges between 1975 and 1980;
- about one-quarter of the recent recruits to the Armed Services read at the ninth grade level, the minimum necessary to follow safety instructions.

And the third essential message is that we don't have to put up with it. We can do better; we should do better; and we must do better.

That message is found most clearly in a report section entitled "America can do it." The section notes that, despite the obstacles we face, the Commission is confident that we can meet our goal. And it cites the remarkable success of the American educational system in responding to past challenges as evidence of its optimism that we can meet the current challenges. To cite just a few of the successes mentioned in the report;

- In the 19th century our land-grant colleges and universities provided the research and training that developed our nation's natural resources and the rich agricultural bounty of the American farm.
- From the late 1800s through mid-20th century, American schools provided the educated workforce needed to seal the success of the Industrial Revolution and to provide the margin of victory in two world wars.
- To this very day, our schools are absorbing vast waves of immigrants and educating them and their children to productive citizenry.

But the message can also be found throughout the report: in the letter from David Gardner transmitting the report to Secretary of Education Terrel H. Bell; in the first paragraph which notes the "justifiable pride" we can take "in what our schools and colleges have historically accomplished"; and in the recommendations which constitute not simply a prescription for improving American schooling, but also a context within which parents and educators, across the nation, can consider their own unique situations and *themselves determine how best to proceed.* Because the context the Commission provides — time devoted to learning, the content to which students are exposed, the expectations we hold for ourselves and our children, and teaching and leadership — constitute, in the final analysis, the tools at hand locally to improve the processes of education. If one examines the various reports issued during the last year and a half, this context turns out to include the elements most people consider to be most crucial in effecting reform.

RECOMMENDATIONS

The Commission made five broad recommendations, with several implementing regulations within each of the five broad areas. These recommendations are discussed in brief below.

Content

The report's recommendations regarding content, the very "stuff" of education, were grounded in the Commission's conclusion that secondary school curricula have been homogenized and diluted, to the point that they no longer have a central purpose. We have, in effect, said the Commission, "a cafeteria-style curriculum in which the appetizers and the desserts can easily be mistaken for the main courses."

The Commission recommended that all students seeking a diploma be required to lay a foundation in what it called Five New Basics by taking the following curriculum during their four years of high school: (a) 4 years of English; (b) 3 years of mathematics; (c) 3 years of science; (d) 3 years of social studies; and (e) one-half year of computer science. They further recommended the achievement of proficiency in a foreign language and more rigorous effort in the fine and performing arts.

Standards and Expectations

The Commission concluded that we expect far too little of our students and that we get, by and large, exactly what we expect. Evidence of our low expectations is widespread. Prior to the Commission's report it was found that:

- less and less homework was required of American students;
- in two-thirds of the states, a high school diploma could be received after studying only one year of mathematics and one year of science;
- one-fifth of all public 4-year institutions in America offered open admissions to any State high school graduate regardless of courses studied or grades attained in high school; and

- many colleges and universities reported lowering their admissions requirements during the 1970s.

The Commission recommended that schools, colleges, and universities adopt more rigorous and measurable standards, and higher expectations, for academic performance and student conduct, and that 4-year colleges and universities raise their requirements for admission. The Commission believed that students would respond positively to higher expectations with heightened aspirations and greater achievement.

Time

Commissioners were struck by the fact that many other industrialized nations have much longer school days and far longer school years than is true in the United States. Because the time devoted to learning is so directly related to how well curriculum is mastered, the Commission made a number of recommendations designed to use available time more effectively and to prompt consideration of extending the amount of time available for learning.

The Commission recommended that significantly more time be devoted to learning the New Basics. This will require more effective use of the existing school day, a longer school day, or a lengthened school year. But the Commission also emphasized that students should be helped to develop better study and work skills, and that effective attendance and discipline policies should focus on reducing disruptions in teaching and learning.

Teaching

With respect to teaching the Commission concluded that "not enough of the academically able students are being attracted to teaching; that teacher preparation programs need substantial improvement; that the professional working life of teachers is on the whole unacceptable; and that a serious shortage of teachers exists in key fields."

The teaching recommendation was made in seven parts, each standing on its own as a major recommendation. I will not list all the recommendations here, but in summary, they emphasize that in order for real improvement to take place in American education, both the status and quality of teachers and teaching must be raised. Indeed, it is my personal view that no more important issue confronts long-term educational reform than how to improve the pre- and in-service education of teachers. According to informal polls conducted recently by the National Conference of State Legislatures and the Education Commission of the States, issues related to teaching and teachers will be one of the top priorities in the States during the next year.

Leadership and Fiscal Support

Finally, the Commission recommended that citizens across the Nation hold educators and elected officials responsible for providing the leadership necessary to achieve these reforms, and that citizens provide the fiscal support and stability required to bring about the reforms proposed.

As the Commission concluded, "Excellence costs. But in the long run mediocrity costs far more." It is also important to note the crucial leadership role ascribed to principals and superintendents in the report.

OTHER ISSUES

Although the overall response to the Commission's report is gratifying, several of us associated with it have been disappointed that several major themes in the report have received scant attention. Further, these are certain themes emerging from the reform movement that deserve our concerted attention.

Learning Society

Press accounts of the report, for example, have misinterpreted it as an attack upon education and educators. Far from it, the report stands as an eloquent reaffirmation of education as a key underpinning of our society. Indeed, in light of new developments in computerization, miniaturization, robotics, lasers, and other technologies and the ever-growing need for a better informed citizenry, the report calls for the development of a Learning Society. "At the heart of such a society," states the Commission,

> is the commitment to a set of values and to a system of education that affords all members the opportunity to stretch their minds to full capacity, from early childhood through adulthood, learning more as the world itself changes. . . In our view, formal schooling in youth is the essential foundation for learning throughout one's life. But without life-long learning, one's skills will become rapidly dated.

Excellence and Equity

In similar fashion, little comment has been elicited about the Commission's careful definition of "excellence" in education, particularly the Commission's view of excellent individual performance. For the individual, the Commission defined excellence as performing on the boundary of individual ability in ways that test and push back personal limits, in school and in the workplace.

Implicit in this definition is the notion that all of us can attain our own excellence, although, very clearly, the boundaries that each of us tests and extends will differ. This concept of excellence prompts the Commission to state that "Our goal must be to develop the talents of all to their fullest." It leads the Commission to insist, also, that the pursuit of excellence and the pursuit of equity in education are not incompatible goals, and that we cannot permit one to yield to the other "either in principle or in practice."

There are some who have expressed the fear that recent reform efforts may endanger this vision that excellence and equity are inseparable. They refer, for example, to standardized testing as biased or insufficient when used as the sole barometer of progress. A former Commission member, Norman Francis,

President of Xavier University (a predominantly black institution) says in response that tests should not be eliminated but improved and used to help students monitor their performance and challenge their achievement. Dr. Francis says, "I do not believe you should discard the thermometer because it reports you have a fever." The challenge is to see to it that the current movement for excellence in education takes into account the particular needs of minorities and other groups the Commission called "most at risk." Diversity of population may require diversity of approaches but it should not lower our expectation that all children can ultimately perform more successfully.

Again, I refer to Dr. Francis when he expresses the fear that minorities "must avoid being self-fulfilling prophets" by failing to expect the highest degree of effort and performance from students. Minimum competency should never become the goal for any of us.

Recently, we have been conducting a recognition program for excellent secondary schools. The criteria applied while stringent are not arbitrary. For example, we have recognized schools where unusual demonstrable progress is evident in student accomplishment in academic areas but also in reduction of drop-out rates, vandalism, and absence. Whittier High School in California where 72% of the children are Hispanic is just such a school. A number of positive changes have occurred at Whittier over the last few years resulting in a school where parents are pleased to send their children, a school whose image has turned from bad to first-rate. It is not only possible; it must be accomplished.

Let me list for you selected characteristics of some successful schools (whose student bodies are predominantly black or Hispanic):

- professional staff believes students can learn;
- there is consensus about school goals; i.e., fostering academic skills (but these schools don't lack other activities like art and physical education);
- expectations are high for both student and professional staff performance;
- faculty believes they have failed if the students fail;
- there is a well-developed support system for teachers including administrative help which limits distractions and protects instructional time;
- there is a collegial pressure among the teachers to work hard;
- staff development is aimed at improvement of the instructional program;
- when new conditions emerge, e.g., influx of immigrants, staff does not say "it is a problem to overcome" but rather they see it as an opportunity to do new things; and
- assessment focuses on student progress and on how to improve instruction; feedback to parents is done regularly.

The sum of all this tells us that what makes these schools particularly effective is not just the hard work of all involved, but also the attitude and spirit which permeate the work. Raising standards is done by policymakers. Raising expectations happens in schools and communities and affirms the interrelationship between excellence and equity.

Content of the Curriculum

Given the move toward greater standardization of requirements for students, e.g., 4 years of English, 3 years of mathematics, on the one hand, and our recognition of student diversity on the other, we must face the issue of what constitutes a rigorous, diversified curriculum meeting various student abilities and needs. We must pay much greater heed to this problem than we have until now.

Role of Businesses and Other Sectors of the Community

There is a rapidly growing interest of community groups in participating in educational improvement. We must take the lead in helping to shape the appropriate contributions to be made by these various groups. We should not lose the opportunity.

Mission of the Schools

Schools have traditionally sought to serve student needs. In recent years, schools have become even more of a focal point for resolving a widespread of societal concerns. Today's reform movement forces us to take a hard look at the school's role and to help define its missions.

FROM RISK TO CONFIDENCE

Americans have not only lived with change in the past, we have welcomed and encouraged it. Faced with the dangers of an uncharted continent, we spanned and mastered it; awed by the vastness of space, we investigated and explored it; perplexed by the mysteries of the atom, we plumbed and unlocked it.

Now a new challenge beckons: how to use our enormous educational enterprise to turn to advantage the risk to our values, standard of living, and international security.

The evidence that we can do so successfully is all around us. It can be found in the past successes of American education, from the development of the one-room schoolhouse to our great research universities.

It can be found in the attention educators, political and business leaders, and the lay public have paid to the report, and in the high visibility of education as a major issue on the national agenda.

It can be found in the spirited debate we are witnessing about new incentive structures for teachers, for quite clearly this topic surfaces many of the elements we must address in seeking excellence — merit, reward for performance, evaluation, and the role and status of teaching as a profession to be more prized in our society.

The evidence that we are up to the challenge is perhaps most obvious in the many schools, districts, and states that have already responded to the Commission's report or have appointed prestigious task forces and commissions of their own to chart their next steps. But it is also apparent in corporate and foundation boardrooms, legislative cloakrooms, Cabinet discussions, and the meetings of learned societies, where discussions of the report, its implications for the Nation, and of what *we* should do about it are the order of the day.

All of this is as it should be, for it was precisely this kind of discussion, debate, and excitement about education that the Commission set out to provoke. If it continues and leads to the kind of positive responses anticipated by the Commission, then we may look back upon the issuing of *A Nation at Risk* as a turning point in American education.

It has quite clearly touched a chord in the American consciousness, a chord which governs the hopes, aspirations, and apprehensions of Americans about the future well-being of their children, their schools, and their society. The task for all of us now is to take this renewed commitment and rededicate it to the creation of a learning society. That responsibility does not belong solely to any one group. As the report concluded:

> It is. . .the America of all of us that is at risk; it is to each of us that this imperative is addressed. It is by our willingness to take up the challenge, and our resolve to see it through, that America's place in the world will be either secured or forfeited. Americans have succeeded before and so we shall again.

If we succeed again, as we already show every sign of doing, then the report of the National Commission on Excellence in Education served us very well. By touching that chord and generating the response it did, it will, in fact, have changed the course of our history.

Teacher Education And Language Development Through Math And Science

Martin S. Friedman

(Abstract)

This address describes New Jersey's efforts to provide excellence in the science/math education of language minorities and other "non-traditional" groups. Model projects are highlighted. Particular attention is focused on the need to prepare elementary teachers to teach mathematics, science, and language across the curriculum. Finally, Dr. Friedman illustrates New Jersey's financial commitment in support of collegiate and school district programs which will improve the mathematics, science, and high technology achievement of students in urban areas.

TEACHER EDUCATION AND LANGUAGE DEVELOPMENT THROUGH MATH AND SCIENCE: NEW JERSEY'S RESPONSE

Introduction

I believe that from the perspective of educational practice across a state, two things can be said with confidence in response to any national report:

1. We're already doing a lot of what is recommended.
2. We still have a long way to go to satisfactorily address the problems the report raises.

In effect, I want to say both of these things in response to *A Nation at Risk* and Milton Goldberg, with specific points and examples.

This conference touches upon, attempts to bring together, many interests and concerns: concerns about minorities, especially blacks and Hispanics; concerns about equity; concerns about bilingual education, about ESL, about the limited English proficient; concerns about mathematics, science and computers; concerns about all levels of education; and concerns about teacher education.

I want to offer a number of observations; each one a small point.

I want to give some snapshots of current facets of the situation as I understand it. These are scattered, statistical, with only loose apparent connections. But they give some sense of the current scene.

I will then describe some of the efforts coming from the higher education community in New Jersey that deal with some of these facets of the current scene.

Finally, I will turn my attention to the theme of this conference and teacher education.

State and National Data

We read the following from the recent United States Department of Education (USDOE) report, *The Condition of Bilingual Education in the Nation, 1984:*

- Approximately 25% of public school teachers had limited English

proficient students; 3.2% of them had the academic preparation or language skills thought necessary to instruct them.

- The number of LEP students has increased from 20% from 1978-1983: from 2 million to 2.4 million.
- The number of school-age children from homes in which the language spoken is not English increased by almost 20% in the same period; from 3.8 million to 4.5 million.

In New Jersey, we have six state colleges, Rutgers University, and four independent colleges with active programs training teachers in bilingual and ESL.

Their combined output last year was fewer than 90 bilingual teachers and fewer than 175 ESL teachers.

Yet, last year, New Jersey issued 297 sub-standard certificates in bilingual and 353 sub-standard certificates in ESL.

Let's look at a different facet.

Nationally, 27% of the student population is made up of minorities; 12.5% of the teachers are minorities.

In New Jersey, 28% of the students are minorities; 10.6% of the teachers are minorities.

Let me be more specific:

- 19% of New Jersey's students are black; 9% of the teachers are.
- 9% of the students are Hispanic, 1.5% of the teachers are.

Teacher Testing

Are we likely to see more or fewer black and Hispanic teachers in New Jersey in the future?

I won't present a full discussion on this, but here is one facet of that discussion which I believe merits serious concern.

As states turn in increasing numbers to the use of competency testing as a necessary criterion for the issuance of teaching licenses, large numbers of black and Hispanic candidates are being eliminated. The extent of the failures was pointed out recently when new competency tests were administered in California and Texas. In Texas, the mathematics portion of the test eliminated 84% of the blacks and 65% of the Hispanic candidates. Eighty-seven percent of the blacks and 65% of the Hispanic candidates failed the reading test, and 80% of the blacks and 56% of the Hispanic candidates failed the writing test.

I do not believe the numbers in New Jersey are likely to be equally dramatic when the new certification tests come into place.

For one thing, the basic skills testing programs and policies in New Jersey will simply prevent the situation from reaching that magnitude. Teacher competency testing in other states which has been especially devastating for blacks and Hispanics has been more like the current basic skills testing program than the test of subject matter that New Jersey will require.

However, other states use tests of subject matter knowledge too, and their general results, though not as dramatic as those in Texas, are in the same direction.

Minority Teachers

The problem of getting more minority and lower SES students into teaching can only be scratched by direct efforts of teacher educators. The problem is system-wide and only system-wide solutions will carry along teacher education in this regard.

But, the problem is acute in teacher education. The educational attainment of black and Hispanic children, we have reason to believe, will be enhanced by their being taught by competent black and Hispanic teachers. This is a bootstrap effect which seems to require special efforts in the area of teacher education both to recruit and do more to ensure the success of, once recruited, black and Hispanic teachers.

This year's college senior may next year be teaching a high school senior who, the year after, could be a college freshman. The turnaround, the visible benefits of attracting, retaining, and highly educating black and Hispanic teachers, could be felt directly within a few years.

This is, of course, not a long-term solution. But we should remember that the college-going rate of black and Hispanic students who complete high school is well below that of whites. I believe good teachers can affect the choices made by high school students, even in their senior year.

New Jersey colleges enroll 60% of New Jersey high school graduates who go on to college. Even though there has been an absolute decline in the number of blacks in New Jersey colleges, that should be reversed, New Jersey colleges are in a position to have a direct effect on the size and quality of the pool of minority teachers.

I want to repeat that teacher educators cannot by themselves, by their own actions, do all that is necessary to deal with this situation, but it is in teacher education that a number of real possibilities present themselves. Colleges should act aggressively to support their teacher education programs in their attempts to play their role.

Equity and High Technology

For those of you who think my concern with teachers is exaggerated because the new technologies, especially computers, will replace, in fact, most of what teachers currently do, and will prove to be the great equalizer in schooling, let me provide a few snapshots on the issue of equity and high tech.

I am raising this here, in part, because I noticed that four of the seven concurrent workshops for this conference are concerned with computers in education.

I noted the following from *Demographic Imperatives* printed in the program for this conference:

"The recent emphasis on science and technology may increase minority underrepresentation in high-income, high-prestige jobs."

Note these data from a recent study released by New Jersey Department of Education, titled: "Report on Educational Uses of Computers in New Jersey's School Districts":

- Higher SES districts average 5.1 years of experience with computers in schools; lower SES districts average 3.4.

- Higher SES districts average a student-to-computer ratio of 50:1; lower SES districts average 80:1.
- Higher SES districts had a greater percentage of staff trained in computer literacy.

In addition, does anyone think the poor, the educationally disadvantaged and their families are buying Apples, Commodore 64's, IBM PC's at the same rate as the affluent?

Whatever the problems and concerns about the appropriate use of computers for learning, the problem of equitable access to the machines and trained teachers is, in my judgment, the overriding problem for minorities.

Well, so much for the snapshots of the current scene, with a little digression on minority teachers.

Some of New Jersey's Efforts

I remarked earlier that one could always respond to a national report by saying that we're already doing what is recommended.

Let me highlight just a few of the collegiate programs of relevance here.

At Stevens Institute there is the *S*tevens *T*echnical *E*nrichment *P*rogram, known as STEP. STEP has been identifying and serving educationally deprived minority and disadvantaged students at pre-college and undergraduate levels since 1968. Currently, there is a six-week residential summer program and a 30-week Saturday program for high school students. Other programs have been for high school students from targeted urban school districts to increase their chances for admission and graduation at technical colleges and universities, and for junior high school students. STEP receives private contributions from corporations, foundations and the support of the National Action Council for Minorities.

STEP is now coordinating, with both Newark and Hoboken school districts, school enrichment programs that will prepare students to enter high school programs and eventually to enroll in Stevens or other similar college programs. The Department of Higher Education is underwriting one such program in FY85, *A Middle School Mathematics, Science and Computer Project,* as part of our Mathematics, Science Teaching and Learning Improvement Grant Program.

In fiscal year 1984 the Department of Higher Education awarded several grants for approximately $73,000 that served over 1,600 women and minority students. The next year the dollar amount increased to over $100,000 and in fiscal year 1986 we expect to provide over $150,000 in grants. These programs, affecting thousands of students and hundreds of teachers, are exciting and productive. Much is being done; much more needs to be done.

Language Development Through Mathematics and Science Activities

In moving away from descriptions of college activities, I now want to address briefly the theme, and especially the subtitle, of this conference and then offer some personal observations about the future of teacher education in New Jersey.

In reading about that area identified by the subtitle of this conference, in talking with Dean Sutman, reading his grants proposals to conduct programs, and further exploring this topic in preparation for this opportunity to address you, I was reminded of the approach to teaching reading in the content areas. This approach, championed by Herber and many others, has taken hold in New Jersey, if one can adequately judge by reading course titles in catalogs. I was also reminded of methods of teaching foreign languages to English-speaking American students that involve enactment of real situations, such as the approach out of Georgetown University called strategic interaction.

I thought of Dewey and Whitehead who both stressed the many virtues of acquiring knowledge in any field by using it. The study of language, apart from its being put to use, on the promise, through true, that it will be useful later, is not the way to go.

I see no reason for mathematics and science to be the only subjects to be taught to non-English proficient or LEP students with an explicit consideration for language development. Certainly the social studies should lay claim to this approach, too. One need only recall Paola Freire and his approach to literacy to realize the potential for improving both language development and social studies by combining the two in the way he did. I am hard pressed to think of an area of the curriculum that shouldn't become aware of the way in which it can contribute to the language development of students, especially lower SES students and language minority students.

The concept seems right to me. Language development through mathematics and science; language development through its use. Anecdotes, experiences, philosophical justifications, all support this approach.

But this approach, like any other approach in education, is not teacher proof.

Teacher Education

Of the many ways in which teachers might fail in their efforts to deal with language development through mathematics and science, let me point to one that might be significant.

I want to consider here elementary teachers, because of their tremendous importance, and because of the problems I think they might have.

To teach mathematics and science to any, but especially language minority and educationally disadvantaged, one needs to know mathematics and science.

Yet a number of collegiate institutions require only one course of each. Prior to the new state teacher education regulations, and even in their attempt to be found in compliance with them, colleges did not require course work in both.

Even with the new regulations some elementary programs consist of one or two science courses and then one methods of teaching science course.

While it may not have ever been true that education courses in general, or methods courses more specifically, ever really stole time from content courses in secondary teachers, it is undoubtedly true for elementary teachers.

The elementary teacher, as a generalist, must be broadly educated in the sciences. And, perhaps more importantly, the elementary teacher must study

science in such a way that s/he is both motivated and capable of continuing to learn about science after leaving college.

Though I admit I lack knowledge of outcome measures, and though I would be pleased to be proven wrong, I must express grave doubts about the efficacy of current elementary teacher education programs at a number of New Jersey's colleges in preparing teachers to teach mathematics and science adequately.

Needless to say, the very idea of language development through mathematics and science becomes an impossibility with teachers who themselves know too little mathematics and science.

Five-Year and Fifth-Year Programs

The legitimate demands on the teacher education student's curriculum are increasing.

Teacher educators cannot take more from the undergraduate curriculum to provide students than that which they have to offer.

Nor should teacher educators respond either to state regulations limiting their proportion of the undergraduate curriculum or to increases in other areas of the curriculum by reducing what they provide to a level below that which is necessary to prepare the kind of teachers our students need.

More and more, the teacher education community in New Jersey will have to shift its emphasis from four-year baccalaureate programs to five-year and fifth-year programs.

The NIE Study Group on the Conditions of Excellence in American Higher Education recently published a report, *Involvement in Learning*. In that report they lamented what they characterized as the excessive intrusion of professional curricula in baccalaureate programs.

The New Jersey Chancellor of Higher Education, T. Edward Hollander, has drafted an analysis of that Report, including recommendations he is considering, for discussion within the higher education community. In that draft he wrote: "A better solution [to the problem of too much professional course work] might be to lessen pressure to pursue professional studies at the undergraduate level by designing five-year bachelor's/master's programs consisting of undergraduate work in the liberal arts and sciences and graduate work in professional fields." He points out that the value of such an approach might vary by field, and he therefore proposed "that the Department undertake a coordinated effort with New Jersey's institutions to investigate the desirability of designing and initiating more five-year programs."

While not wanting to foreclose the question of the desirability of this in teacher education in every case, you should note that the Chancellor has proposed, and the Board of Higher Education has endorsed, a program of competitive grants for FY86 to assist colleges in developing and strengthening Master's programs in teacher education.

It seems to me that those of you with the special concerns of this conference, the joining of interests in mathematics, science, language development, and culturally diverse populations within the educational enterprise, should not

look for more of the undergraduate curriculum to ensure that these specific concerns are properly addressed. That is a zero-sum game which should no longer be played. Rather, it seems to me that in most, if not all, cases the preparation of teachers which involves all of these interests must be conceived as, at a minimum, a five-year process.

However, while from the point of view of the curriculum a five-year program makes the most sense, in my judgment, we, of all people, must remain especially sensitive to the possible economic burden that this might entail and guard against this feature alone becoming a barrier to minorities entering the teaching profession.

The Whole University

The problems in the preparation of teachers are not found solely in the education schools and departments. The preparation of teachers is the responsibility of the whole institution.

I don't mean this in the general sense in which it could also be said that teacher preparation really begins with a person's own schooling experiences.

I mean it more specifically. The quality of the curriculum and the quality of instruction, not just in education courses but throughout, are extremely important in the collegiate preparation of teachers.

While Secretary of Education Terrel Bell described well the general finding of the NIE Study Group on Higher Education, by asserting that they found higher education had a case of the sniffles, not all observers have been so kind.

I believe the very latest in "national reports" on higher education is that produced by William Bennett, of the National Endowment of the Humanities. Entitled *To Reclaim A Legacy*, it is based on the work of a Study Group composed of more than 30 persons, including Wayne Booth, Chester Finn, Hanna Gray, David Reisman, Frederick Rudolph, and John Silber. Toward the very end of that report, one which I would characterize as a proverbial stinging indictment, William Bennett wrote, in a section titled "Concluding Thoughts":

> All too often teaching is lifeless, arid, and without commitment. On too many campuses the curriculum has become a self-service cafeteria through which students pass without being nourished. Many academic leaders lack the confidence to assert that the curriculum should stand for something more than salesmanship, compromise, or special interest politics. Too many colleges and universities have no clear sense of their educational mission and no conception of what a graduate of their institutions ought to know or be.

In my view, Bennett's assessment is closer to the mark than the one from the NIE group. Bennett accuses humanities instructors of committing what I consider to be one of the worst sins a teacher could commit, which is teaching "in ways that discourage further study."

I believe we ask too much of faculty in schools and departments of education if we ask them to overcome the effects of "lifeless" and "arid" teaching;

of teaching which "discourages further study." Approximately three-fourths or more of the undergraduate curriculum is outside of education. Much of the study in education comes toward the end of the undergraduate curriculum and a great deal of it, perhaps half, is field experience. As important as the work of education faculty is in the preparation of teachers, there are limits to what can be accomplished by it.

Colleges *are* doing much; and much more needs to be done.

State Support

The Department of Higher Education does not only exhort, regulate, and evaluate. It also supports institutions in their efforts to improve and deliver.

In the area of teacher education, the Board of Higher Education has recently endorsed a proposal to enhance collegiate teacher preparation. The Board has recommended to the Governor funding the proposal with $2 million. In addition, the Board of Higher Education has recommended continued funding of the Mathematics, Science, and Computer Science Teaching Improvement Program at $1 million and a new $4 million program for urban areas.

The Governor's leadership and legislative support have been strong and we hope they will continue, with these programs.

I also want to quickly mention that New Jersey's share of the Federal Education for Economic Security Act (P.L. 98-377) is a total of $2.7 million with $800,000 going to higher education institutions. This money will be dedicated to mathematics, science, computer science, and foreign languages, with an explicit concern for addressing the needs, in the words of the Federal legislation, of the "underserved and underrepresented."

Money alone will not solve these problems; but without money they are probably insoluble. Federal and State leadership will not solve these problems; but without them there is little chance. Leadership—saying the right things—and support — putting money where the mouth is—will hopefully provide the stimulus that those of you who have been working so hard and well in these areas need, to continue your efforts and enlist the efforts of your colleagues to better education in New Jersey.

Science And Math: A Natural Context For Language Development

Edward De Avila

Research over the past fifteen years has lead to the conclusion that there are three major interacting factors which must be taken into account when designing and implementing programs for language minority students. These three factors include first, a need to understand the impact of socialization practices on interest and motivation to achieve in the school setting. Second, there is a need to rethink the concept of intelligence and to gain a better understanding of the relationship between intellectual development and learning and/or thinking. Third, there is a need to gain a better understanding of the influence of sociopsychological and linguistic factors on the design and delivery of remedial programs.

Discussion will focus on how these three factors interact to explain the limited success of programs aimed at remediating basic linguistic skill deficiencies of language minority students. In addition, discussion will show that, while each of the three factors is necessary in the design and implementation of programs, each is insufficient by itself to fully account for the success or failure of programs. A conclusion to be drawn for the discussion will be that successful programs require the simultaneous consideration of all three. A second conclusion will be that science and math activities, if organized properly, can create an environment which not only accommodates the academic, linguistic, and social diversity of language minority students, but also provides a meaningful context for acquiring a broad range of social academic and linguistic skills. Thirdly, it will be concluded that the above considerations constitute general principles which are applicable across diverse student population and academic content areas.

Discussion will conclude with a description of how the above sociopsychological and linguistic considerations have been integrated into the design and implementation of one such successful program (FO/D), and how this program has been successful in facilitating the development of thinking strategies while at the same time remediating basic skills and English language deficiencies.

EXCERPTS FROM EDWARD DE AVILA'S KEYNOTE ADDRESS

In a way, I have been preparing for this particular talk for about twenty years....

When we think about pursuing academic excellence on the part of language minorities...we need to think about three basic elements. These three basic elements constitute what I would call 'the big picture'. It then becomes necessary to think about individual aspects within each of these: first is intelligence or development, second is interest and motivation, and third is access.

Intelligence is what a child can do with what [he/she] knows.... At Stanford, "intelligence is a conjunction of repertoire and capacity." The assessment procedure, if intelligence is defined as "what a child can do with what he/she knows," involves two parts: What is it that a child brings to the test situation? What is it that a child brings to the school situation? That includes such experiential factors as language, background, culture home life, [and] knowledge of the demands and characteristics of a test situation. Children have to know how to deal with a test aside from knowledge of the content of a test. If the child doesn't understand how to make the answers clear to you, then the child is going to receive a low score. You won't know whether or not that low score is predicated on an inability to solve the problems or simply not knowing how to tell you. Case in point: I was asked years ago to work with a school district on a reading program which found that their Spanish children were scoring very low on achievement tests. Results were predicated on the little op-scan sheets [the type] where you fill out a little box. I calculated the probability of a correct answer on the part of these kids, and I found that [it] was 1:7. What's chance? ...25! Well, obviously, there must be something wrong.... I explained to [30] children what the pattern was.... I found that they filled out every one in four.... I calculated another probability and I found it was .25. So I went to the school board and I said, "Folks, I can save you a lot of money. You don't need the program...or the test booklets. All you need to do is to tell the kids how to fill out the forms."

...How is it, since children differ so much, that we can compare them? ...We have the notion of what we call 'control repertoire', where we teach the children everything they need to know in order to give you an answer — such as how to fill out the form. Two, we provide them with all the vocabulary necessary in order to give an answer...the child may not have a word, but the child has a notion. What we find is [that] by using control repertoire assessment procedures, many of the so-called ethno-linguistic group differences wash away. In other words, they're, by far, more a product of simple experiential factors than... of any... real difference in cognitive abilities.... That doesn't mean...that language minority kids are not in bad trouble academically.... So then, one might ask: What's the real difference between an academically successful child and one who isn't? My conclusion... is...the number of available strategies that the kids have.... Intelligence, by itself, is insufficient, although necessary for academic success...

...A second major issue is...interest and motivation. In the education of language minority children [and] low achieving children, we find ourselves designing programs predicated on the remediation of basic skills deficiencies. The design of these programs is, inevitably, in direct opposition to interest...we find kids doing endless repetitions...the famous ditto sheet.... If math computations and ditto sheets are so interesting, how come teachers don't take them home and do them for the fun of it?! ...They are totally devoid of context.... We find all manner of things being done through ditto sheet educa-

tion . . . individualized instruction [means] the slower children do one, everyone else does two. . . . We have the introduction of computers . . . now we have vertical ditto sheets! . . . These kinds of things fail to take into account the natural interest [of] children.

. . . We look at research and from that research we make assumptions as to what kids like. . . . Publishing research findings based on scale differences that have no . . . social reality . . . does far more harm than good . . . . If we design programs predicated on one notion of style . . . interaction . . . one not only feeds into the notion of cultural sterotypes, but one denies access . . . . I think it's . . . interesting that we say that Latin Americans . . . do not have an interest in mathematics because it's too abstract . . . . I have never met anybody who found calculus easy!

. . . Academically successful kids . . . are maximizing payoffs and minimizing risks . . . . Learning is "risking being wrong." One has to be in a position where being wrong is not held against you.

The third aspect is . . . access. Access has a number of facets to it. The first facet is . . . "issues related to social status." A better way of putting it is "money". Money enables you to do certain things you otherwise might not do . . . . [It] enables children to know how an airplane works because they've been there . . . to identify certain kids as musically gifted because their parents can afford the piano lessons. Access . . . finds its origin in the concept of equity in the United States . . . . The concept of equity as it currently exists cannot accommodate the diversity brought by language minority children. The first issue that people have talked about with respect to equity had to do with *who* was going to get educated; the second had to do with *where*. Separate, is not equal. The third, which is where we're at at this moment is *what* are we going to teach, and *how* are we going to do it? I would suggest to you, that the design of certain programs constitutes a denial of access. For example, consider placing somebody in a calculus class [who] speaks no Chinese, and everybody else speaks Chinese. I would say that you have the propinquity, you have opportunity, but you have no access . . . . Going to school no more makes you educated than standing in a garage makes you a car . . . . Moreover, the kinds of instruction . . . may well also preclude access . . . . The children do endless ditto sheets . . . to the extent that that precludes other kinds of activities, particularly in math and science . . . . Higher order thinking skills are precluded, because . . . they require a lot of intellectual give and take . . . interaction.

We have remedial programs, but how do we remediate something that was never there? . . . The emphasis is on . . . road skills . . . which are basically memory work . . . . There are certain kinds of things where a memory is the only way you can go about learning it . . . . However, being able to [memorize] does not necessarily guarantee the ability to solve problems . . . to generalize. Knowing the name of the state of Kansas does no good in Sri Lanka. Knowing the names of things does not necessarily generalize . . . . Knowing the function and/or concepts [is] what's critical . . . . Things that generalize require a different kind of structure . . . a different kind of managerial organization with respect to the classroom. One might teach the facts of science in a lecture, or [arithmetic]

facts, but one will never teach [either] without the interaction. If the only access that students have to truth is through the teacher we have a severe problem. The problem is, you have a status-inducing situation...to the extent that there are predetermined right or wrong answers, known exclusively by the teacher. Those children that most directly match the needs, values, and purposes of the teacher are viewed as the quicker, brighter, and more adjusted. If the [children have] no access to truth on their own, and the education is predicated on that kind of model, very quickly the kid is not going to do it anymore. John Ogbu, the anthropologist from Berkeley, says, "It isn't that the kids have a low self-concept with respect to academic subject matter. It's that they have an accurate perception of their probability for success."

Teachers are human beings, they're just regular folks. They will interact with those that they are successful interacting with.... Those children perceived as having higher academic status in the classroom are the ones that get to do the things... Delegation of responsibility is in direct relationship to status. Walk through a grammar school one day and look at the kids in kindergarten. They are all mixed...and can't tell what's going on. There's an awful lot of give and take. Then look at first grade...we start denying them access to one another. If you look at fourth grade...they are separated in the classroom by virtue of reading groups [and] they start to socialize with one another predicated on those groupings. The social status starts to mirror academic status. Now, who gets to do the innovative programs? ...The more successful ones are programming the computers; the less successful ones are programmed by the computer.

How do we take advantage of the intelligence of the ["less successful"] kids? How do we provide them with something that's interesting, and at the same time expose them to educationally valuable subject matter? The answer was simple. It's all in the popular cultures. Kids like to do things which are important to the parents as demonstrated by what the parents do and not what the parents say...the parents interact with those things all the time and that value is transmitted to the child. There are other things in the culture that I call "conceptually nested"... Children of different levels of complexity and development can come back to the same thing over and over again with fresh eyes. They can see it in a new way.

I would suggest to you that language minority children and children in general are most readily responsive to science and mathematics...because they are interesting...and being different doesn't penalize you...particular solutions are invariant...names generalize.

Let me give you a definition of what I call bilingual education for science/math education: It's the use of an approach involving two languages such that that which is learned is independent of either languages...the concepts generalize, the words don't. It would be far better to teach the child how to fish than to give the child the fish.

...Education is the only business in the world in which the client must conform to the needs of the purveyor. In all other businesses the client is always

right...in this one, the client is always wrong. Look at how we organize classrooms...for *our* own needs. We organize tests for our own needs, not from the point of view of the child. If the kids don't particularly respond to the six rows of six kids we need another organization, I call it the carnival...you don't see the organization...it's embedded.... We put together a series of science and mathematics experiments on tables. We had kids go from table to table...reproducing classics in science and math.... One of our major purposes [was] showing children [that] science and mathematics concepts are tools [that] enable us to do things that we could not otherwise do. We ran the program for about four years...the evaluators came.... What they found was very straightforward... They [the children] were learning a lot of science and mathematics...how to read and write.... One aspect was far more pronounced...the kids were gaining, Language! Language seems to be the strongest, most demonstrable outcome.

Children have to become responsible for some of their own learning. The teacher is not able to make the number of moment to moment decisions necessary to guide the specific behavior of each and every child in the class.... How does one delegate authority? Half of them don't speak English!... With rights, go responsibilities. With a delegation of authority, go rules.

We got small groups to conduct individual science and math activities... Each week we have shifts in roles.... How do we assign these roles in a way that doesn't promote or underscore status? We simply take a deck of cards and shuffle them in front of the kids.... They love it!

What we are talking about in terms of excellence in education...is taking into account all of these things, i.e., intelligence, motivation, and access.

This session is available on videotape.

RELATED PUBLICATIONS AND PAPERS

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Panel Discussion

ISSUES AND APPROACHES TO THE MATHEMATICS AND SCIENCE EDUCATION OF LANGUAGE MINORITY STUDENTS

MODERATOR:

Peter J. Negroni, Superintendent, School District No. 12, Bronx, New York.

PANELISTS:

Anthony R. Sancho, Chess and Associates, Inc., **"Socio-demographic Issues and Access to Higher Education and High-Tech Careers."**

Joyce Penfield, Assistant Professor of Language Education, Graduate School of Education, Rutgers University. **"The Role of the ESL Teacher in Reinforcing Language Development for Student Progress in Math or Science Classes."**

Charles Mitchel, Assistant Executive Superintendent of Elementary Education, Newark Board of Education, formerly, Principal, Franklin Elementary School. **"Science and Mathematics Experiences at the Elementary School Level: Problems and Potential for Success."**

Stanley Kluj, Coordinator, 21st Century School, Perth Amboy, New Jersey. **"A Model Computer Laboratory for the Basic Skills Instruction of Minority Students."**

SESSION FACILITATOR:

Diego Castellanos, Planner, Office of Equal Educational Opportunity, New Jersey Department of Education. Author: *Bilingual, Bicultural Education: THE BEST OF TWO WORLDS.*

Presentation available on videotape

Learning For The 21st Century

Stanley Kluj

The year 2000 may seem a long way off but at the rate at which we have been traveling, the 21st Century is merely around the corner. As educators, we must keep abreast of the rapid advances in technological development and prepare the students of today to be productive citizens of tomorrow.

Recognizing the necessity to address the present and future needs of students, Perth Amboy has embarked upon an ambitious project titled "The Twenty First Century School." Housed at School Ten, the largest elementary school in the district, the program will be developed via curricula in Communications Technology, Environmental Awareness, and Creative Arts. These areas were selected as a starting point because of their relevancy to education and world events today and in the near future.

Communications

How often has the term "our shrinking world" been used to describe the impact high technology is having upon the world? Although the earth may not be shrinking physically, technology has certainly made it possible to be in touch with people halfway around the world within hours via supersonic jet or within minutes through telecommunications. The ability to be in contact with people of other cultures in a very short span of time necessitates gaining a greater understanding of the languages and the customs of others. Knowing how to make effective use of modern communications technology can surely increase the chances for better understanding of world problems and thus aid in advancing the solutions to those problems and the chances for world peace.

THE ENVIRONMENT

The great strides that technology has made in the last hundred years have not been without cost to our planet. Our natural resources are dwindling at an ever-quickening pace. Our rivers and oceans are fast becoming the septic tanks of industry, and our landfills are threatening our drinking water. If humankind is to maintain and improve its quality of life and survive with any semblance of dignity in the 21st century, the students we teach today must become sensitive to the magnitude of the threat posed by environmental pollution. At the same time that we are teaching our students about the problems which our environment is encountering, we must help them establish a set of values that will encourage them to use technology to improve the condition of the world for humankind.

CREATIVE ARTS

As the technological world expands and the bombardment of new information increases, it becomes increasingly more important for people to have

outlets for their own individual creative expression. Therefore, the 21st Century School will provide a program to nurture the needs of students to express themselves creatively in music, art, dance, writing, or any number of other creative arts.

HUMAN UNDERSTANDING

An area often less considered in future thinking is the area of human understanding, whether it be for oneself or for one's fellow man. As it stands, we've already walked on the moon and sent space probes to Mars and beyond, but are barely out of the Middle Ages in our regard to our fellow man. It's an area that we will have to look at very carefully and begin developing some specific programs to address the needs of human understanding and awareness. Since productive citizenship is determined by how useful a person is to himself and society, we as educators will have to take stock of our expectations for students and create an atmosphere more conducive to learning and developing a positive image toward self.

TEACHING STRATEGIES

To implement such a program, varied and alternative teaching strategies which are most effective in carrying out a program for the 21st Century must be carefully considered. Instruction which stresses the skills, knowledge, and attitudes that influence a learner's behavior long after he has forgotten the facts and details are very important.

Some strategies that may be employed include: individualized instruction, inquiry as a method to gaining answers, pupil centered learning, use of media in addition to texts, flexible schedules, developing positive attitudes toward learning, interrelated content (reading, music, social studies, science, math), problem solving, decision making, etc.

Any program which hopes to address the needs and concerns of the future must remain flexible and be receptive to new and changing ideas. Changes usually occur first in private business and industry with education attaching itself to the tail end of innovative projects. The 21st Century School project provides an opportunity for education, at least in Perth Amboy, to be at the leading edge of innovative programs. It also affords teachers a rare opportunity to give children the knowledge, skills, and attitudes that will serve them well when they are ready to assume responsibility for contributing to society.

The 21st Century belongs to the children who are our elementary students today. The five to nine year olds will be in their mid-twenties by the year 2000. The future of mankind may well depend on how well we get along with each other as well as with what compassion and understanding potentially devastating technologies are put to use.

"The Role Of ESL Teacher In Reinforcing Language Development For Student Progress In Math Or Science Classes"

Joyce Penfield

I will briefly explore various models which can be followed by ESL/bilingual teachers in providing support services for LEP children in math and science mainstream and bilingual classes. I will mention the importance of collaborative planning between ESL teacher and mainstream teacher of math and science. Finally, I will suggest that science lessons involving concepts fairly simple to particular students (e.g., K material for 4 grade LEPs) can equally serve to reinforce science concepts and provide a visual context to facilitate English language practice.

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"Language through Science: An Integrative Model," *Ethnoperspectives in Bilingual Education: Bilingual Education Technology*, ed. Raymond Padilla. Ypsilanti, Michigan: Eastern Michigan University, 107-120.

"A Problem-Solving Model for Integrating Science and Language in Bilingual/ Bicultural Education," *Bilingual Education Paper Series* (California State University—Los Angeles), August, 1-30.

Concurrent Sessions And Plenaries

CONCURRENT SESSIONS

Mary Farrell, Director, Learning Disabilities, Fairleigh Dickinson University, NJ

Patricia Klagholz, Director of Mathematics, University City High School, Philadelphia, PA

Annette Lòpez, Director, B.E.S.T. Center, Fairleigh Dickinson University, NJ

Patricia Mullinex, Courses by Computer, Inc., State College, PA

Mark O'Shea, Math/Science Coordinator, College of Education, Fairleigh Dickinson University, NJ

Marietta Saravia-Shore, Director, Project C.H.I.P.S., Teacher's College, Columbia University, NY

PLENARY SESSIONS

Ana Uhl Chamot, Director of Research Information Services, National Clearinghouse for Bilingual Education, Rosslyn, VA

J. Michael O'Malley, Senior Researcher, National Clearinghouse for Bilingual Education, Rosslyn, VA

Constance Kamii, Professor, School of Education, University of Alabama, Birmingham, AL

Using Learning Strategies To Understand Secondary Science Presentations

Anna Uhl Chamot
(with J. Michael O'Malley)

Learning strategies are techniques or maneuvers that students can employ on their own to facilitate learning and remembering. For students learning English as a second language, learning strategies are particularly important because they can provide students with more efficient ways of learning both language and content in academic settings. For teachers, the strategies are important because students' use of existing strategies often can be refined, and students' familiarity with strategies can be extended to new tasks and a wider repertoire of strategy types.

The major focus of this presentation is on the application of learning strategy instruction to developing the academic listening comprehension of ESL students in high school. As students move into senior high school and college, they must become increasingly proficient in acquiring information through the lecture mode. For many ESL students the difficult of this task is compounded because they have not developed listening skills appropriate for technical presentations. By using strategies such as selective attention, notetaking, and cooperation, students can substantially improve their understanding and recall of material presented orally.

This presentation first provides a brief description of a recent two-phase study of learning strategies with ESL students: a) a descriptive phase which was designed to identify learning strategy applications with a range of both discrete and integrative language tasks; and b) an experimental phase which was intended to analyze the effects of strategy training on selected language tasks in an ESL classroom. In the descriptive study, the language learning strategies of beginning and intermediate high school ESL students were identified and classified based on student interviews. In the experimental phase, intermediate level ESL students were taught to use learning strategies for vocabulary, listening, and speaking activities in the classroom.

The presentation next provides a demonstration of learning strategy applications to understanding a science lecture on astronomy. The demonstration will illustrate applications to classroom practice of learning strategy techniques derived from the descriptive and experimental studies. The demonstration will emphasize the utility of learning strategies for academic listening, and indicate that strategies of the type discussed can be integrated into the curriculum and taught to students.

RELATED PUBLICATIONS

With A. U. Chamot, G. Stewner-Manzanares, R. P. Russo, and L. Kupper. *Learning Strategies Utilized in Listening and Speaking Skills in English as a Second Language.* Accepted for publication in Language Learning, 1984.

With A. U. Chamot and R. P. Russo. *A Review of the Literature on Cognitive and Metacognitive Strategies in Second Language Learning.* Submitted for publication to Contemporary Education Review, 1984.

Language Development In A Piagetian Beginning Arithmetic Program

Constance Kamii

Traditional instruction uses worksheets and drills. Piaget's theory, on the other hand, emphasizes *thinking* (rather than writing and memorizing) and *social interaction* (rather than individual work). The two kinds of activities I recommend on the basis of Piaget's theory are (1) situations in daily living (such as the counting of votes) and (2) group games (such as card games). In these activities, children exchange points of view and develop language. They also develop intellectually, socially, morally, and politically. Further details can be found in a book I wrote entitled *Young Children Reinvent Arithmetic* (Teachers College Press, P.O. Box 1540, Hagerstown, Maryland 21741).

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Number in Preschool and Kindergarten: Educational Implications of Piaget's Theory, (Washington, D.C.: National Association for the Education of Young Children, 1982).

With Rheta DeVries, Physical Knowledge in Preschool Education: Implications of Piaget's Theory, (Englewood Cliffs, N.J.: Prentice-Hall, 1978).

Group Games in Early Education: Implications of Piaget's Theory (Washington, D.C.: National Association for the Education of Young Children, 1980).

A Review Of Research On Learning Styles: Implications For The Development And Implementation Of CAI For Bilingual Students

Mary L. Farrell

This address reviews the literature on cognitive style and the bilingual student. Studies in field independence/dependence indicate differences between field independent and dependent students and teachers in crucial classroom variables such as reinforcement, content and organization of instruction, and social/emotional climate. Thumbnail sketches *(Figure 1)* indicating the preferences of field dependent and field independent students and teachers illustrate the extent to which learning styles and teaching styles may match or mismatch. Sample lesson plans are given to demonstrate how computer-assisted-instruction may be used to facilitate instruction when the teaching/learning style match is less than optional.

Thumbnail Sketches of Field Dependent and Independent Students' and Teachers' Learning Preferences on the Classroom Variables of Reinforcement, Organization and Content of Instruction and Social/Emotional Climate

	FIELD DEPENDENT STUDENT	FIELD INDEPENDENT STUDENT	FIELD DEPENDENT TEACHER	FIELD INDEPENDENT TEACHER
REINFORCEMENT	Functions best under conditions of extrinsic reward. The nature of the extrinsic reward is critical. This student's performance is particularly enhanced through social rewards (e.g., hugs). Criticism or a lack of encouragement depresses performance for this student more than for his field independent counterpart.	Tends to learn more than his field dependent counterpart under conditions of intrinsic motivation. Seeks nonsocial rewards such as candy, stars.	Uses social reinforcement (e.g., hugs and expressions of endearment). Less likely than field independent counterpart to use corrective feedback (telling a student when a response is incorrect and why it is incorrect) or negative evaluation (expressions of displeasure when a student performed below capacity).	Favors corrective feedback and negative evaluation. Uses gold stars, candy as extrinsic rewards.
ORGANIZATION AND CONTENT OF INSTRUCTION	This student needs structured learning experiences since he is less likely to impose his own organization on an unfamiliar body of information. The students' performance is enhanced under conditions of teacher's close monitoring of the learning process (e.g., with feedback on mastery of concepts at checkpoints in a unit	This student is more likely than the field dependent student to develop mediators (e.g., verbal categories) for structuring information. This student is better able than his field dependent counterpart to retain material presented in large units without benefit of close teacher monitoring of mastery of material.	Favors teaching situations that allow interaction with students (e.g., discussion). Uses questions primarily to check on student learning. Encourages more learning by modeling and provides more guidance to students. Perceived as emphasizing global aspects of concepts and as humanizing and personaliz-	Favors teaching situations that permit them to organize the learning situation (e.g., lecture or discovery method). Encourages more trial and error learning. Adopts a consultant role with students. Uses questions to introduce topics and as follow-up to student answers. Favors curricula that emphasize an-

FIGURE 1 (Continued)

	FIELD DEPENDENT STUDENT	FIELD INDEPENDENT STUDENT	FIELD DEPENDENT TEACHER	FIELD INDEPENDENT TEACHER
ORGANIZATION AND CONTENT OF INSTRUCTION	rather than at the completion of a unit). Student does better under teaching conditions which permit adopting a "spectator" approach rather than an active participant approach to instruction. This student tends to model teacher behavior. Also, since this student tends to approach learning intuitively he does better with methods and materials which require a global rather than analytic response. Performs best when concepts are presented in a humanized format and are related to his personal interests and experiences. Requires working from the whole to specifics. This student does better than his field independent counterpart on material with social content. Prefers study in the social sciences and humanities.	This student tends to take an active approach to learning and will be more successful than his field dependent counterpart on tasks which require an analytic approach. This student does not do as well as field dependent counterparts on material with social content. Prefers curricula that stress details about facts and tasks that involve working from the specific to the whole. Prefers study of science and math.	ing curricula. Tends to specialize in social science and the humanities.	alytic style and may also fail to include sufficient social or human content in presenting the curriculum. Has a greater interest in the abstract and theoretical. Focuses on facts and principles and relies more on impersonal curricula such as graphs and formulas. Tends to specialize in math and science.

FIGURE 1 (Continued)

	FIELD DEPENDENT STUDENT	FIELD INDEPENDENT STUDENT	FIELD DEPENDENT TEACHER	FIELD INDEPENDENT TEACHER
SOCIAL/ EMOTIONAL CLIMATE	Likes to work with others to achieve a common goal. More openly expresses feelings toward the teacher and is interested in the teacher's personal experiences. In an ambiguous situation, will ask others for help.	Prefers working alone. Seeks less physical contact with teacher and limits their interaction to the tasks at hand. Is less likely to ask others for help in an ambiguous situation.	Expresses more approval and warmth; encourages group achievement by students.	Maintains a more formal relationship to students and focuses heavily on structional objectives. Encourages individual student achievement.

FIGURE 2

Sample Plans for Using CAI to Compensate for Teaching/Learning Style Match or Mismatch

FIELD DEPENDENT STUDENT/FIELD DEPENDENT TEACHER

MATH FACTS

	TEACHER	COMPUTER
REINFORCEMENT	Teacher can be expected to refrain from negative evaluation. Teacher will give positive extrinsic rewards including hugs.	Computer should use child's name. If a child fails on problems previously done correct, computer will remind him of his history of success with the fact or facts involved.
ORGANIZATION AND CONTENT OF CURRICULUM	This teacher doesn't particularly like "teaching" facts nor does he like analyzing and planning follow-up practice for an individual child's strengths and weaknesses.	Computer can be largely "in charge" of assessing individual students' mastery of math facts and presenting selective practice. Progress reports can be printed out for the teacher. Also, computer can supply students with verbal strategies to aid recall. Verbal strategies can be used as prompts.
SOCIAL/EMOTIONAL CLIMATE	Will organize baseball teams for math facts review.	Use computer time to encourage child to work on his own. Motivation provided by game format.

FIGURE 2 (Continued)

	TEACHER	COMPUTER
REINFORCEMENT	Teacher may not give a sufficient amount of positive reinforcement.	Computer should personalize exercises by using the student's name. Also, exercises should include a fair amount of practice on facts known in order to give the child a consistently successful experience for which positive reinforcement can be given.
ORGANIZATION AND CONTENT OF CURRICULUM	Teacher will probably analyze students' strengths and weaknesses and will systematically follow up with instruction in the areas in which it is needed. It is possible that too many facts will be given for study at any one time.	Computer can be used to assign practice on sufficiently small units of study. Also, even computer drill and review (to say nothing of game formats) is more motivating for work on facts than a worksheet would be.
SOCIAL/EMOTIONAL CLIMATE	Teacher may organize a competition for fastest time on sheets of 100 math facts.	Computer can use a game requiring students to work cooperative in pairs or teams.

FIGURE 2 (Continued)

	TEACHER	COMPUTER
REINFORCEMENT	Appropriate to students' needs.	
ORGANIZATION AND CONTENT OF CURRICULUM	Teacher models computational procedures. May use a humanistic, verbal strategy to aid comprehension (e.g., you can't take 6 away from Mr. O so you go to his next-door neighbor to borrow). May also use visual aids. May not be good at error analysis.	
SOCIAL/EMOTIONAL CLIMATE	May develop learning centers in which students practice computational procedures in quasi real-life settings.	

Cooperative Learning: Grouping With A Twist

Patricia B. Klagholz

Research, primarily at Johns Hopkins, has documented positive effects, both academic and social, when certain key factors, the twist, are present. Those key factors are team scores and team recognition as well as the traditional grading utilizing individual scores.

Effectiveness has been documented in terms of increased academic achievement, more positive inter-group relations, higher levels of self-esteem and a more positive attitude toward school.

These cooperative learning methods are flexible since these positive results have been shown both in elementary and secondary schools, in urban, rural, and suburban schools, and in various subject matter areas. In mathematics, this approach can be utilized for problem-solving activities, work sheets, discovery lessons, or games.

Cooperative learning is an effective and efficient use of teacher time. Each student has three helpers. Peer pressure becomes a positive force. Math anxiety is allayed by a support group, and the focus is on accomplishing the task together.

Just as you must teach for transfer, you must teach for cooperation. The teachers must structure the learning environment and their own behavior in order to achieve these effects.

Problem-solving activities provide good initiating activities. They challenge, require group discussion and a written record of research. The best problems have simple beginnings all can understand.

You can employ cooperative learning techniques in your own classroom without discarding your individual teaching style. Key in on the critical factors, namely the structuring of your own and your students' behavior and the twist, team reward and team recognition.

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Articulating Math, Science And Bilingual Teacher Training

Mark O'Shea
Annette Lòpez

Science inquiry lessons provide for an abundance of opportunity to help students develop language skills. Through the development of inquiry skills in a small group context, students engage in problem solving and in the identification of their roles in the problem solving process. The interpersonal communication in the small groups facilitates language development and concept development. Following a demonstration of a science activity, participants will analyze the lesson in terms of its approach to language learning.

A teacher training program has been modified to underscore the intimate relationship between science investigation, mathematics, and language skill development. This teacher training model will also be explored.

Computer-Assisted Bilingual Math Instruction For Elementary Students

Patricia M. Mullinex

There is courseware available for microcomputer delivery that can help students of culturally diverse backgrounds improve their language skills while studying mathematics and science. This workshop will focus upon one particular example of a comprehensive courseware package in the area of basic arithmetic skills that is available for Apple delivery in both English and Spanish. There will be opportunity to examine this program to determine how courseware of this type might be used effectively in bilingual programs and to determine some of the general qualities that should be sought when computer software is to be purchased for bilingual programs.

The Elementary Mathematics Classroom Learning System is comprised of forty separate lessons and a management system. The management diskette enables instructors to enroll students by name, maintain records of each student's progress, and generate learning prescriptions and small group reports based upon each student's current level of achievement.

With sufficient hardware and software available, it is possible to have Hispanic students complete each new lesson from the Spanish version of the product to become familiar with content and any new vocabulary that might be introduced; then they can move to the English version of the same lesson for additional practice and reinforcement; and finally they can return to the Spanish version for testing and recording of data. When using a program in this way, it becomes important that the student have access to a different set of practice items each time a lesson is repeated. Consequently, when the student moves to the English language version, he or she can feel that the repetition of the lesson is worthwhile from both a mathematical and a language standpoint.

Booting Up: Broadening Computer Access To Hispanic High School Students

Marietta Saravia-Shore

"Booting Up the System" is an innovative high school computer curriculum that is designed for limited English proficient students to accomplish two goals:

1) to develop career entry level computer skills, stressing word processing and data base management, and

2) to strengthen ESL skills by developing communicative competencies in speaking and writing.

The gap between affluent suburban students and urban minority students in access to computers as educational resources and tools for learning is well known. Limited English proficient students have the least access to computers in most educational systems.

This presentation will describe and illustrate with slides of teachers and students at the demonstration site, the approach being used by the Computer CHIPS Demonstration Project to give LEP students access to computers and computer training within the ESL program. An outline of the 12 modules of the curriculum will be handed out and the presenters will walk the audience through the sequence.

The CHIPS approach to teacher training will also be described and the multiple uses of the CHIPS Computer Competency Checklists will be explained. Sample checklists will be handed out and the presenters describe the skills on the checklists. The checklists are used:

1) to focus the learner's (teachers and students) attention on those skills that need to be mastered for which they will demonstrate their competency.

2) as a diagnostic test to enable learners (teachers and students) to know which skills they can perform and which skills they till need to practice in order to master.

3) to provide documentation of the outcomes of the CHIPS teacher training for teachers and students.

4) to enable teachers to feel competent that they can demonstrate specific skills.

5) to stimulate students to interact verbally in English with each other as they jointly solve problems and resolve questions in practicing the competencies.

6) to enable students to monitor their own progress.

Current research on the teaching of ESL has concluded that the integration of subject content in teaching ESL is more motivating and more conducive to learning English. The CHIPS curriculum was built upon this premise, and is proving to be high interest content which is motivating to LEP students.

Conference
Summary And Recommendations

CONTRIBUTORS

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SUMMARY, CONCLUSIONS AND RECOMMENDATIONS OF THE CONFERENCE

The Conference was designed to deal directly with the following three proven premises or issues regarding society in the United States today and in the future.

1. Radical changes in the demographics of the United States require that a substantial effort be made to challenge the members of our large minority populations with an education that will prepare them effectively to enter the fields of science and technology.

2. The science/mathematics education movement of the late 1950's into the early 1970's has not prepared the pool of scientifically literate personnel needed to secure the United States or to assure everyone the present quality of life for its citizens.

3. There is need to improve the efficiency of language instruction across all segments of our society, but especially for students with limited English language proficiency in order to meet the changing nature of job opportunities in America.

It brought together over 200 professionals from many levels of education to determine how schools and teacher education programs might best deal with these issues. The professionals included 40 individuals who are involved in research and practice in the areas under deliberation. Below are the major conclusions reached and enunciated at the final plenary session.

1. Because language and other minorities are poorly represented in scientific and technological fields it is especially important to use science/math with ESL instruction for these populations. This practice should help to alleviate this poor representation.

2. Unfortunately English language skills are most often taught out of context and isolated from other disciplines. Yet research shows a strong relationship between language and cognition.

3. The areas of science and mathematics are especially appropriate vehicles for teaching English language, because of the "hands on" activities associated with these disciplines, and because of the national need to improve the scientific literacy of the citizenry. In addition they are particularly useful vehicles for English as a second language instruction because of the commonality of scientific concepts and scientific language across many cultures of the world.

Below are a series of recommendations based upon these major conclusions:

1. Programs for pre- and in-service teachers of English language and ESL must be restructured to include additional experiences related to science/math content.

2. Programs for preand in-service teachers of science/math must be restructured to include experiences that will sensitize these professionals to the important role the English language *must* play in their teaching. In addition these professionals must be involved in practical experiences that support the conscious inclusion of English language instruction in their planning and teaching.

3. All teachers need to understand how children and other humans learn first and second language, with emphasis on indirect language learning.

4. All teachers must have experience with the several teaching strategies and learning styles, and understand how each is related to improving learning among the various cultural groups.

5. All teacher education programs, but especially those that prepare English and ESL teachers, must emphasize the understanding that for most students English language is *not* an end in itself. Instead it is a vehicle for educational advancement in other disciplines.

6. All teachers at the elementary level must be educated and trained to incorporate "hands on" activities from the sciences/math into their teaching, especially their teaching of English or ESL.

7. Science/math must become a crucial and increasing part of the elementary curriculum at all grade levels; and examples from these academic areas must be utilized extensively in teaching to help promote English language skills.

8. At the upper grade levels and at the intermediate and more advanced language levels of teaching greater emphasis must be placed on activityoriented teaching; with schools being restructured to allow greater student involvement in more meaningful and interesting experiences. This restructuring must allow for extensive changes in the nature of school experiences so that they can effectively compete for students' attentions. To meet this goal, restructuring must allow for more effective integration of subjects and programs. All of the teachers of language and other minorities must be encouraged to collaborate, plan, and implement a cross-disciplinary plan of instruction which will develop the English language ability of the students.

9. Teachers in training must have experiences and involvement across several cultures. (Learning from books about other cultures is in itself, inadequate.) Urban community involvement and travel abroad should be encouraged.

10. Adequate education of students from the many cultures represented in our society cannot occur in an atmosphere of provincialism. Provincialism must be eliminated from educational practice at all levels of education in the nation's schools and in teacher-training.

11. More "intervention" programs must be implemented at the junior high school level that encourage students who are minorities to consider a career in math, science, and/or technology.

12. More research is needed which illustrates the relationship between language proficiency, ability, and cognitive performance.

13. All educators must make a conscious effort to achieve quality education for all students, especially for those from minority cultures. They must plan accordingly in order to meet this objective.

14. The schools must demand excellence in the teaching of all students but especially in the teaching of language minorities. Teacher education institutions themselves must model this excellence and demand it of those who are to teach or are already teaching.

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RELATED PUBLICATIONS: Francis X. Sutman

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